

# THE MATING BEHAVIOUR AND BREEDING OF AUSTRALIAN DEATH ADDERS, GENUS: *ACANTHOPHIS* (Serpentes: Elapidae).

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## Introduction

This article is based primarily on observations and notes obtained by the author on captive snakes of the Genus *Acanthophis* (Death Adders) over a seven year period ending July 10<sup>th</sup> 1984. It deals primarily with mating behavior of [common] captive Death Adders, i.e., *A. antarcticus*, as opposed to other forms such as *A. pyrrhus* or *A. praelongus*. In 1984 I held 20 adult *A. antarcticus*, 10 adult *A. pyrrhus* (Desert Death Adders) and seven *A. praelongus* (Northern Death Adder) and all appeared to have identical mating behavior. The exclusion of the latter two species from this article unless otherwise stated is due to the relative lack of data on either species compared to the vast amount accumulated on *A. antarcticus*. Individual Death Adders are referred to in brackets by the file numbers which I gave them. Many of the details relating to examples are omitted here due to space limitations. In this article mating is usually synonymous with copulating.

## Brief-Description of the Death Adder

The "common" Death Adder (*A. antarcticus*) has a wide distribution in Australia excluding some northern monsoonal areas, most deserts and the far South East. This snake averages a total length of about 60 cm (non growing adult males); or about 80 cm (non growing adult females).

Death Adders are very thick set, viperid in appearance, and often capture prey by caudal luring, (Carpenter, G. C., Murphy, J. B. & Carpenter, G. C., 1978). Tail twitching (caudal luring) by hungry snakes is an involuntary reflex action.

These snakes range in colour through reds, oranges, greys, browns and blacks. Greenish-grey specimens are also known. Scales are reasonably smooth. Desert Death Adders (*A. pyrrhus*) are

somewhat smaller than *A. antarcticus*, always orange in colour and have rugose scales all over the body (excluding ventrals). *A. praelongus* has variable colours and is intermediate in many respects between *A. antarcticus* and *A. pyrrhus* (Storr, 1981). Death Adders from New Guinea and other Islands to Australia's north appear to be most closely aligned to *A. praelongus* and like Australian specimens assigned to this species are highly variable in form and colour. More than one species may be lumped under the *A. praelongus* label. Other forms of Death Adder, including the Pilbara "black-headed form" sometimes known as *A. armstrongi*, the Barkly Tableland form, sometimes known as *A. hawkei*, (the last two names assigned by Wells and Wellington - not cited here) and a long-headed form from near Mount Isa, Queensland, may also eventually be widely regarded as separate species or subspecies.

All types of Death Adders may be sexed externally by the relative size of the tail. Males have distinctively longer and thicker tails than females (Hay, 1972). Probing is not necessary to accurately sex this species if one is familiar with it. In my own experiences, the only specimens I have sometimes had difficulty sexing by external appearance/inspection have been some young specimens of *A. pyrrhus*. These snakes can however be easily sexed by probing.

Male combat dances in this species have not been observed and almost certainly do not occur. In the wild Death Adders are reproductive at 22 months (males) and 42 months (females) (Data collected on wild museum held specimens, Shine, 1980). Captive specimens are usually reproductive at considerably younger ages, (Mirtschin, 1982, and authors own records). Males and females may reproduce at less than 20 months of age. The author was able to raise a single female *A. antarcticus* from newborn juvenile to young adult

in a period of about 15 months (AAA-1)(in 1977-78). Newborn *A. praelongus* born in the care of Victorian keeper, Rob Valentic (in 1996) and held by various people have shown varying growth rates in captivity. However those that have been kept heated and fed the most have attained growth rates well of up to three times that of wild specimens (by estimated weight). For example a specimen bred by Valentic and held by Andrew Lowry (of Victoria) exceeded 30 cm (total length) within 7 months of birth (in 1996).

Death Adders are convergent with the viperidae in many ways (see Shine, 1980 for further details). Live young are produced in the late summer to autumn periods (Australian seasons) and between 5 and 20 young are usually produced, although figures outside of this range are also known. Total length at birth varies but usually ranges somewhere between 120 mm to 200mm (all types of Death Adder). All Death Adders held by this author were solely fed on mice and small rats, except newborns, which were fed skinks.

#### **Duration, Frequency and Times of Mating**

Death Adders, will in captivity, mate frequently. Males usually take the initiative in starting mating and are the most active participants during copulation. Intermittent mating between two of my own Death Adders, for up to one month, has occurred (snake numbers AAA-18 male, and AAA-3 female) but is extreme. Male Death Adders will commonly mate (copulate) with several female Death Adders within a given month if there is sufficient opportunity. One male Death Adder of mine copulated with three separate female Death Adders over a three hour period (AAA-11 male with AAA-29 female, AAA-3 female, AAA-5 female).

Typical matings last a few hours, although it may range in time from seconds to days. Termination of copulation seems usually, though not always to be initiated by the male. Death Adders may mate at any time of year although most mating occurs in late Autumn, Spring and early Summer. A female who does not want to continue copulating with a male will crawl away, dragging the male along with his hemipene.

By providing various conditions in captivity, Death Adders can be further (successfully)

encouraged to copulate.

#### **Sexual Attractiveness of Death Adders**

Some males are distinctly more sexually active than others, size of males is irrelevant with respect to sexual activity.

Many males become more sexually active with age. Some females are more attractive to males than others, although rarely are males confronted with a choice (in either captivity or the wild). *A. antarcticus* appear to be a usually solitary species. Larger fatter females are generally, though not always, most attractive to males. This factor makes *A. antarcticus* females attractive to *A. pyrrhus* and *A. praelongus* males, due to the relatively large size of *A. antarcticus* females compared to the other two species. *A. pyrrhus* and *A. praelongus* females are unattractive to *A. antarcticus* males, and only once has the author witnessed an *A. antarcticus* male copulating with an *A. pyrrhus* female (AAA-11 male and APY-1 female). *A. pyrrhus* and *A. praelongus* males will regularly copulate with *A. antarcticus* females. Despite the above, the three species of Death Adder discussed prefer mating with their own species as opposed to other species. Generally cross-specific mating only occurs when a sexually active male has no choice of mate and is highly aroused. For example, AAA-11 male mated with APY-1 female only after AAA-11 had attempted to copulate with AAA-5 female and AAA-11 was removed from AAA-5 before copulation had commenced, and placed in a tank with only APY-1 female.

Species isolation mechanisms for the three species of Death Adder are probably mainly environmental; rarely (if ever) do two species seem to occur together and even more rarely would they mate. Post mating isolation mechanisms probably also occur. More research is required in this area. Such research is probably best conducted in the northern third of Australia, where multiple forms of Death Adder are known to occur in relatively close proximity to one another.

It is commonly reported in the literature that female snakes which have freshly sloughed are more attractive to males than other snakes. Although such is true, its importance in making

females attractive to males is probably over estimated. Female Death Adders with white eyes, (prior to sloughing) will be readily mounted by males.

Males do not usually engage in sexual activity in the week or two prior to sloughing, after which they are most sexually active.

Not all males are sexually active at the same time, meaning that it is possible for several male Death Adders to have virtual non-stop mating in a captive collection (this in fact occurred in my own collection of snakes).

Death Adders, wild or captive are not known to "aggregate" for any purpose. Denning is also not known to occur.

#### **Inducing Mating**

If a male Death Adder is determined to mate with a female, then he will invariably succeed, thus motivating or inducing males to mate can be a crucial factor in gaining successful copulation/s and breeding in captivity. Usually even without inducement Death Adders will mate frequently in captivity.

To further induce even more mating activity in Death Adders the following procedures can be carried out:

- (a) Separation of the sexes, and preferably isolating individual males (because males will attempt to mount and mate with other males in the absence of females).
- (b) During mating periods and just before and after these periods, males usually fail to eat. Males commonly have vigorous mating periods lasting a month or two, followed by a similar period without sex; after which males again vigorously pursue sex.

It is therefore important to ensure that males are well fed (but not over-fed) during non-mating periods, so as to enable them to satisfactorily last through non-feeding mating periods. (Death Adders are usually reliable feeders). Overfed Death Adders tend to mate less than their leaner

counterparts.

As Death Adders don't usually feed at average ambient temperatures below 20°C they must be maintained at higher temperatures than this for at least six months a year. During winter, temperatures for my snakes were allowed to fall to below 10°C on occasion without apparently harming the snakes. Mating occurs at almost any temperature although warmer temperatures are preferred, (matings at 12°C are recorded). For males it is wise to raise the temperature slightly after a "feeding spree" prior to mating. ("Feeding spree" refers to a period of high food consumption usually over a period of a month or more).

A day or two after raising the temperature of the male, say from low 20°C to mid 20°C, the male is introduced to a female/s (at any temperature now). Mating will normally commence immediately, with the male mounting the female as soon as it is placed in the same tank. It is usually easy to tell when a male is eager to mate by the fact that they tend to go off their food and start to pace up and down their cage.

If Death Adders of opposite sex are housed together, mating can be induced by a change in temperature, either up or down, which will stimulate mating (such a temperature change occurs over a period of less than a day and is of at least 2°C). In tanks with a significant diurnal range, an unusually hot or cold day has the same effect.

Barometric (air pressure) changes (which are not controlled by the keeper) can act to stimulate mating activity. Low pressure troughs, cold fronts, etc., which have an accompanying air pressure fall stimulate the most vigorous mating activity seen by the author in Death Adders. Death Adders are particularly sensitive to falls in air pressure preceding fronts even when there are no changes in humidity or temperature. In the first 10 days of October 1982, 5 female Death Adders were copulated with on no less than 30 occasions by several males held by the author. Such mating frequency is not unusual. This barometric sensitivity applies to snakes kept either indoor or outdoors, whether kept at temperatures corresponding to the external temperatures or not. (Such barometric sensitivity has been documented by the author in other snakes including *Liasis*

*perthensis* (Ant-hill Python), *Morelia spilota* (Diamond Python), *Vermicella annulata* (Bandy Bandy) and *Hoplocephalus bungaroides* (Broad Headed Snake)).

Barometric sensitivity acting as a stimulus to mating certainly also applies to wild Death Adders (Hoser, unpublished field data).

Most mating activity in the author's collection of Death Adders occurs in the 24 hours preceding the arrival of fronts. Obviously not all matings result in pregnancies, (Mirtschin, 1976, own unpublished data).

Excluding matings in 1982 in the author's collection, approximately 100 matings in this collection resulted in three pregnancies, all of which aborted mid-term. The author was later able to successfully breed Death Adders, getting young from three separate females (see below).

#### Basic Mating Plan

Charles C. Carpenter and Gary W. Ferguson (1977) described stereotyped mating behaviour in snakes, giving each aspect of behavior a number. Death Adders were not a snake mentioned in the paper although they abide by the following number in behavior (sometimes or always) when mating.

1, 4, 13, 19, 20, 24, 42, 55, 56, 59, 68, 69, 71, 76, 81, 82, 83, 84, 92, 100, 102, 104, 105, 106, 107, 108. (See reference source for more details).

The mating behavior of Death Adders will not be explained by citing a case example/s, rather by simply explaining typical procedures. It should be noted that Death Adders in captivity have no fear of any potential enemies and readily (virtually always) copulate in the open.

Firstly the male takes the initiative by mounting the female, and placing his body directly on top of the females' body so as to cover as much of the female's body as possible. The male caresses the female with his head and "chin" and with his tail.

The male tries to get his tail underneath the female's body, and to hopefully make contact with the females' vent. If the vents of the two snakes are not in alignment the male will edge his whole

body backwards or forwards until their vents are adjacent. Sometimes a male will re-orientate his whole body (on top of the female) if he cannot make immediate contact between vents. Re-orientation, (i.e., crawling at least one female body length over the female's body) is mainly done if a male faces the wrong way relative to the female. Facing the wrong way on the female is where a male's head is over the female's tail and the male's tail is over the female's head. The male will, when facing the "wrong way" still sometimes attempt to copulate with the female by pushing his tail under the female's neck and if the male is highly aroused even evert his hemipene in this position.

When aligning his body over the female's body the male will often move with his tail raised in the air presumably releasing some scent over her body. Younger (although not necessarily smaller) males will flatten out their bodies over the female's when covering it, though older (more experienced) males don't usually bother with this "foreplay". Younger males will crawl over the female's body aligning themselves several times before actually attempting copulation. Younger males may carry out "foreplay" for hours prior to "actual" copulation occurring. Older males carry out minimal "foreplay" usually copulating with females within sixty seconds of mounting them, unless the male is only slightly aroused and unlikely to copulate anyway.

The female role in initiation of copulation, though less active than that of males is still important.

Females that are stimulated by male's overtures generally coil up slightly, usually in a singular circular position. This enables males to crawl over females, over and over again, to "properly align themselves" without uncovering the female whilst moving around. More importantly females raise their tails in the air and vigorously twitch them. Females also appear to force out their cloaca. All this behavior probably serves to further excite male Death Adders, although it's effects in doing so seem minimal. Whether or not copulation takes place is decided solely by the male, and males that attempt to copulate with females probably will do so, no matter what the female does, short of the female crawling away. In captivity a female cannot escape a male which is determined to mount it.

To avoid copulating, females can coil themselves into a relatively tight ball with their vent covered by one or two very heavy coils of body. (Female Death Adders are relatively very heavily built). Their vents are then effectively impregnable to males, although males that persist in trying to copulate will invariably succeed. In the wild it is doubtful if females actively escape sexually active males, because of the heavier build of females, and the ability of males to follow their scent trails. It is therefore probable that any contact between females and sexually active males in the wild result in copulation. The same applies in captivity.

When vents are approximately together the male Death Adder will evert one of his hemipenes (on the "correct side" of his tail) and it will insert itself in the vent and up inside the females' body. Usually, the hemipene will not swell until inside the female's body. Occasionally when the male is highly excited the hemipene will swell significantly outside the female's body, but usually only for a period of a few seconds.

Often a male will only manage to partially insert his hemipene into a female resulting in him rapidly withdrawing a partially erect hemipene and reinserting it into the female.

Once a male Death Adder has inserted his hemipene into the female and fully erected it the female is effectively unable to resist copulation. On rare occasions a female will cause a break in copulation leaving a male with an exposed, erect hemipene. If this occurs well into a copulation the hemipene will take a while to "shrink" in size and return to the inside of the base of the males' tail. This may take more than 10 minutes. Death Adders have large, spiny double lobed hemipenes (all species). During copulation the female usually moves little except for some involuntary twitch on any part of the body. The male rapidly twitches throughout copulation, particularly around the neck, far lower body and tail. The twitching in males is usually caudo-cephalic (runs from the tail end towards the head). The orientation of males during copulation usually only changes in response to movements by the female. Ejaculation (sperm transfer) is preceded by most vigorous bodily twitching (particularly around the tail and lower body). After which there is a drastic reduction in activity by the male snake. Often copulation will terminate within 10 minutes of

ejaculation by the male, although multiple ejaculations appear to occur. (The phenomenon of sperm transfer in Death Adders has been deduced from variously timed breaks in copulations, hemipene conditions at these breaks and fluid exuded by the ends of the lobes of the hemipenes). The author has photographs of a Death Adder (AAA-9 male) ejaculating after a break in copulation with AAA-5 female in 1980, which was published on page 19 of the book *Australian Reptiles and Frogs* (Hoser, 1989). "Multiple ejaculations" result in prolonged copulations, possibly lasting for days, although more detailed observations, including moving film footage are required.

Hemipenes are pink to red or purple in colour prior to ejaculation (rich in fresh blood) and purple to blue in colour after ejaculation (lacking in fresh blood). Hemipenes don't reduce in size immediately after ejaculation, generally taking time to do so. Copulating Death Adders will usually continue doing so regardless of human interference. On 8 May 1981 men free-handled connected Death Adders (AAA-8 male and AAA-5 female) and ashed cigarettes on them. In 1980 the author accidentally dropped 1000 watts of light globe on top of the same two copulating Death Adders. In all instances the snakes continued unperturbed. On occasions when the female terminates copulation, (probably less than half the time), the female either attempts to wave her rear end around, wrenching out the males' hemipene or she more often will simply crawl away. In crawling away the female drags the male along with her, the male will, whilst still connected to the female crawl backwards, following the female in order to lessen the effect of the female dragging him by the hemipene. If the female stops moving forwards, the male will, by initially moving "backwards" orientate his body so it again completely covers the females' body and he is in the normal mating position. This is also probably the least painful position for the male to be in during a copulation. Usually however once a female tries to terminate copulation by crawling from under the copulating male, the "typical" mating position is never re-obtained. Copulation usually terminates within 60 minutes of a female attempting to crawl away from a copulating male.

### Birth of Young

"Successful" copulation probably usually takes place between April and October of one year resulting in offspring being produced between February and May the following year. Results from different breeders have varied and so there is further investigation required into when the most successful matings occur. Likewise for studies into the sperm storage ability of these snakes.

Well and truly gravid Death Adders will still copulate. Prior to birth, feeding usually, but not always ceases (although feeding in early pregnancy stages is voracious). Females are also known to drink more than usual in the latter stages of pregnancy. In the weeks prior to birth of young, females are unusually restless (Hay 1979) being most active in periods of barometric instability (accounting for the relatively large numbers of gravid female Death Adders run over on Australian roads in late Summer/Autumn).

In the wild Death Adders usually breed only every second year (all species). *A. antarcticus* can breed every year in captivity, as a result of improved conditions, but sometimes genetic determinants still force females to breed only every 2<sup>nd</sup> year. Birth of young Death Adders usually, but not always takes place when low pressure troughs pass over, usually in the form of cold fronts, (Mirtschin 1976, Sayers, personal comm., own observations). These conditions (in Australia) are characterised by low air temperatures (relatively) (low 20's, (°C), often rain, and always relatively high humidity. Prior to the arrival of cold fronts, weather conditions are usually very hot, often 10°C higher than local seasonal averages. That these are the conditions which most stimulate mating in Death Adders is important. The author in the early stages of keeping the species had three *A. antarcticus* pregnancies, all aborted, before he was able to successfully breed them. One failure may have been due to an under age/undersized female being gravid (AAA-2) the others possibly resulting from an *A. pyrrhus* male copulating with *A. antarcticus* females (APY-3 male - copulating with AAA-2 female and AAA-5 female). Overheating of males (failure to sufficiently cool them) over the winter months was cited by Rick Shine as the likely cause of breeding failure and after this was 'corrected' breeding success followed in three

females the following season.

Death Adders are an easy snake to breed in captivity. Over twenty successful breedings of *A. antarcticus* are listed in the herpetological literature (refer to Hoser, 1995 for the most complete bibliography on the subject) and this author is further aware of several other unpublished successes. Furthermore, *A. pyrrhus*, *A. praelongus*, Barkly Tableland Adders and the Black-headed Pilbara form have all been bred in captivity. Breeders for these forms include the following:-

Greg Fyfe (*A. pyrrhus*)

Brian Barnett, Roy Pails, Robert Valentic (*A. praelongus*)

Brian Barnett, Roland Burrell, Graeme Gow (Barkly Adders)

(Name not cited here for legal reasons) Pilbara adder.

Death Adders from New Guinea have also been bred by keepers in the northern hemisphere. Illustrations of New Guinea Death Adders can be found in O'Shea (1996).

### Unusual Behaviour in Mating

Homosexual behaviour as mentioned earlier is easily induced in males, simply by having one sexually active male with another male. The sexually active male may even attempt to insert his hemipene into the other male, sometimes with success. "Copulating males" have been observed by the author, although such occurrences are very unusual.

Lesbian behaviour is virtually unknown in Death Adders. On about three instances one female (AAA-4) attempted to mount (in male fashion) AAA-2 female, and tried to raise AAA-2's tail with her own. No vent coupling was observed, and these "mating" attempts only lasted about an hour each. In all cases AAA-2 was almost completely stretched out with AAA-4 making sure her body completely covered that of AAA-2 female. AAA-4 was the slightly larger snake. No rational explanation for the above incidents has been offered and they remain a bit of a mystery.

Eating when copulating is done by all females, of all types of Death Adder. Males do not eat when copulating. In the summer of late 1982 male

Death Adders held by the author copulated, terminated copulation, eaten food that was available, then recommenced copulating (AAA-7, AAA-11). Generally, sexually active males abstain from feeding. Summer fasts by Death Adders of periods of a few months are not unusual. The heavy build of these snakes usually results in little loss of condition over periods of abstinence. Other keepers of Death Adders have also occasionally reported on male Death Adders feeding immediately after mating.

As stated previously, male combat dances in Death Adders are unknown and almost certainly don't occur. However, one incident regarding potential male combat is worth noting. On 16 April 1982 (7.00 am) four male Death Adders (AAA-23, AAA-8, AAA-9, AAA-18) were observed to have bite marks on their necks; several on each snake's neck. AAA-21 male and AAA-2 female were copulating and neither snake had bite marks on them. These six snakes were the only snakes in the same cage (a large 1.6 metre display cabinet). No food had been near any snake for the previous few days, thereby excluding any possibilities of accidental attack of snakes whilst feeding. The author believes that AAA-21 attacked the other males, probably when they attempted to mount either himself or AAA-2. This behavior doesn't seem to be typical. Occasionally, a male Death Adder will mount already copulating Death Adders, but usually give up attempting to copulate very quickly. Usually sexually active males will simply avoid copulating snakes. Further investigation is required here.

#### **Raymond Hoser's 1983-4 breeding of Death Adders (*Acanthophis antarcticus*)**

In the period leading up July 1984, the author maintained a breeding group of Death Adders *Acanthophis antarcticus*. For the three years preceding July 1984, these snakes were housed in a terrace house at 170 Lawson Street Redfern, NSW, (an inner Sydney suburb). All snakes were held in a number of 1.3 - 2 metre cages and routinely shifted from cage to cage, which were all identical in set up. All cages had clay bottoms, hardened to be rock-like with undergravel (conqueror cable) heating cables to provide extra warmth as necessary. All lighting, cables, etc, were controlled by timer switches making day to day maintenance of temperature and lighting

unnecessary, except when changes were to be made.

Following some years of apparent breeding failure and an analysis of keeping methods by Rick Shine (herpetologist at Sydney University) it was decided in 1982 to reduce heating of the captive snakes, in particular that over the winter months. This was done by reducing hours per day that heating cables were turned on, particularly in the spring/autumn periods and winter months. For about 2 months per year the cables were turned off and no snakes were fed.

This appeared to work as the following season, not only did the Death Adders breed successfully, but so too did Ant-hill Pythons held in the same collection (in similar style cage). Notable is that the Ant-hill Pythons had failed to breed the previous year (1981-2) in the same cage set up, the only difference being that there was no cooling over the winter months.

In early 1984 there were four gravid Death Adders and three produced live young. From the data arising from these births and data already held numerous facts about Death Adders and their biology emerged. The key facts were as follows:

1. Death Adders typically produce young in late Summer to Autumn
2. The gestation period appears to be from six to nine months (in Hoser's case), or if gestation is/was shorter, than sperm storage in this species occurs,
3. Most, but not all females, produce young every second year whilst some produce annually,
4. They copulate at any time of the year - not all pairings being successful in fertilising the females,
5. The sex ratio of offspring is approximately 1:1,
6. The colour red is the dominant gene (grey is the only other possible colour and it is recessive)(in Sydney Death Adders),
7. They are oviparous - but most females fail to have all of their ova fertilised.

Most of the above was deduced from notes held by the Author, relating to the previous seven year period and not detailed here, including the detailed breeding data and details of all young born.

Many facts, however, can be derived from the data provided in table 2. The mating habits and other aspects of this species' biology have been dealt with previously (see, Hoser 1981, 1982, 1983, 1985, 1987, 1995).

#### **Breeding details**

Typically, the females appeared to give birth, during seasonally cold and humid weather, usually when the air pressure is rising. This is true for most specimens both in the wild and held in captivity by Hoser (also Hoser, unpublished observation). An account of the birth of one snake's young ( File no. AAA-29 ) is given in table 1.

Prior to giving birth female Death Adders become unusually restless and, in the case of the author's specimens, tried to excavate the soil in their cages, presumably in an attempt to find a damper location in which to give birth. Interestingly, this pattern of behavior started up to 60 days prior to parturition.

The live young varied in length although litter mates tended to be of similar size. The babies ranged in size downwards from 17.9 cm total body length - the average length was 16.5cm.

In this species, at least, the usual theory that larger litters contain smaller babies did not apply; however larger females did tend to produce larger young.

Within a single brood the smaller specimens usually, but not always, had reduced chance of survival in the period shortly after birth.

#### **Miscellaneous notes**

Data on the young and the mothers, were kept after the births had occurred, and although most of the young snakes were released shortly after their birth, four females were kept for future study (later stolen on 10/7/84).

Death Adders have been bred by others besides myself, and documented in papers including by Peter Mirtschin (1976, 1982, 1985), Joe Bredl (no paper), Peter Hudson (1979) of South Australia and Merv Hay (1972), Stuart Barnes (no paper) from New South Wales. Their breeding data is similar to my own. All noted that Death Adders

mate at all times of the year and only produce young in late Summer and Autumn - and usually only every second year. They also observed the production of unfertilised ova and that they usually give birth in seasonally cold and wet weather. Shine (1980) investigated wild specimens held in museums and his findings concur with mine. My study is the first to investigate the colour genetics of the Death Adder. My findings (first published in 1985)(Hoser, 1985) have since been corroborated by a more recent study (Johnston, 1996).

In view of the results of the 1984 breedings one of my aims is to gather further evidence to support above conclusions and gather information relating to tail colour genetics of Death Adders (which is influenced by multiple alleles/genes). In view of the fact that I currently (January 1997) do not hold any Death Adders (any form) and at best am only likely to hold limited numbers at any stage in future, it is essential that other keepers and breeders of these snakes keep accurate breeding data and freely share their records.

Death Adders are potentially threatened in the wild wherever they occur by habitat destruction and pests such as Cane Toads (*Bufo marinus*). They obviously can be bred in captivity (and all four females and the males concerned were long term captives); It is hoped that more captive breeding programs will take place although in the current climate in Australia this course of events is unduly restricted, particularly in NSW and Qld.

#### **Postscript**

On 10th July 1984 the Author's house was broken into illegally by officials from the New South Wales National Parks and Wildlife Service (NPWS) (Hoser, 1993). This break-in was filmed and shown on National television. All reptiles, along with most files, computer disks, photographic equipment, slides etc. were taken. What wasn't taken was smashed. This was, apparently, a reprisal for the Author's exposition, in previous years, of smuggling rackets involving NPWS and the break-in was the climax of a vendetta maintained against the author. Later court action revealed that the officials had no right to enter and steal the possessions (including snakes). Details of the corruption and vendetta were also revealed in much detail. However,



despite legal actions by the author to recover stolen goods only a small portion were returned. A "Statement of claim" against NPWS in the NSW Supreme Court remains current as of 1997 as well as more recent defamation action against the department launched in 1994 (Hoser 1996).

In spite of theft of notes, the author retains over 100 pages of data relating exclusively to mating *A. antarcticus* and several times this amount of data relating to *A. antarcticus* generally.

Less information is held on *A. pyrrhus* and *A. praelongus* due to the theft of relevant files on 8 May 1981, further theft on 10<sup>th</sup> July 1984 and less data accumulation generally. Colour slides of all aspects of mating behaviour in Death Adders are also held, many of which were published in *Australian Reptiles and Frogs* (Hoser, 1989) and others later in *The Reptilian Magazine* (Hoser 1995).

**Table One.**

**Birth of young - (AAA-29)**

Times given are A.M., Eastern Summer Time (24<sup>th</sup> Feb 1984).

1.00	(1)	first born,
1.01-1.05	(10)	
1.15	(1)	
1.16	(1)	
1.18	(1)	
1.24	(1)	
1.50	(1)	
2.35	(1)	
2.40	(3)	
2.41	(1#)	
3.00	(4)	
4.04	(2)	
4.05	(1#)	
4.06	(2+ 1#)	
4.50	(1)	
5.10	(2)	

..... time for all young to be born 4hr. 10 min.  
# = unfertilised ova.

**Table Two.**

**Young born In 1984.**

Snake file no.	AAA/25	AAA/29	AAA/5	AAA/3
Colour adult	red	grey	red	grey
Date	26/1	24/2	26/2	twinned egg 28/2
Last meal	24/1	27/11	12/11	N/A
first after	3/4	24/2	2/3	N/A
No. of young	7	27	7	0
unfert. ova	9	6	14	1 (twinned)
dead young	3	12	2	N/A
sex ratio	3:1:3	12:15	4:3	N/A
colour ratio	4:1:2	0:27	5:2	N/A
mean length	150	164	166	N/A

For sex ratio the numbers run male:female:unknown.

For colour ratio the numbers run red:grey:unknown.

**Snake sources: (Females only)**

AAA/25 - Cottage Point Road, Cottage Point, NSW, caught 2<sup>nd</sup> December 1981.

AAA/29 - Dead Death Adder Row/Coal and Candle Creek Road, near Terry Hills, about 1 km from McCarr's Creek Rd. Turnoff. Caught 12<sup>th</sup> January 1982.

AAA/5 - Terry Hills, NSW. Caught 28/10/78. Obtained by author on 4<sup>th</sup> March 1979

AAA/3 - Mt. McCarr, near West Head between McCarr's Creek Road and West Head Road. Caught 24<sup>th</sup> December 1978.

All other Death Adders (*A. antarcticus*) in this paper were also from the Sydney district (within 80 km of GPO).

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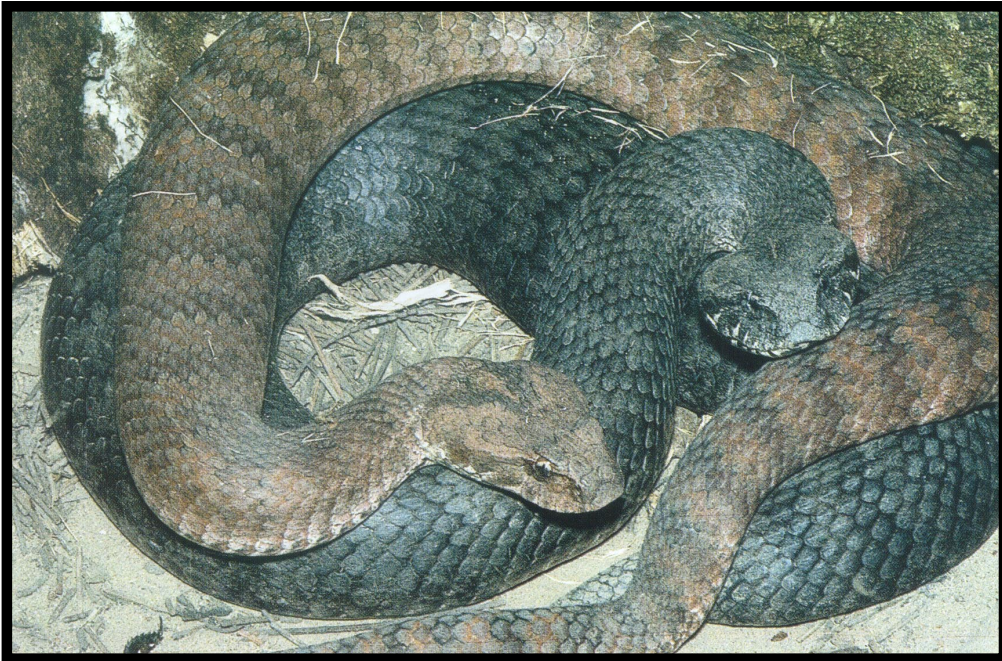
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- See Hoser 1995 for further Death Adder citations. That paper can be downloaded from the Internet at  
<<http://www.lexicon.net.au/~adder/adder1.htm>>





**PHOTO 3: Death Adders *Acanthophis antarcticus* AAA 9 & 2  
Copulating. Photo: Raymond Hoser**



**PHOTO 4: Common Death Adder *Acanthophis antarcticus*  
giving birth. Photo: Raymond Hoser**

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